

# X2G200ND06P1

# HIGH POWER NPT Low loss TYPE 2-PACK IGBT MODULE

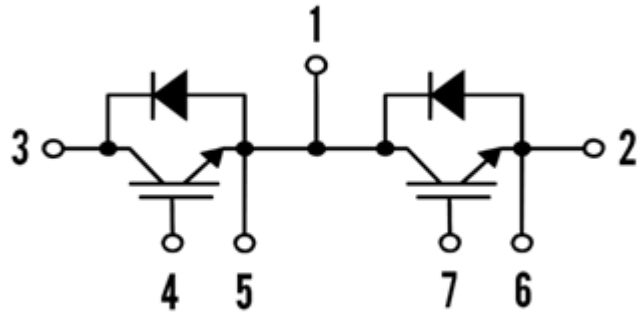


**600V**  
**200A**

PACKAGE : M1

**PRELIMINARY**

## ■ CIRCUIT DIAGRAM



## ■ FEATURES

- Non Punch Through (NPT) Technology
- Fast & soft inverse CAL diodes
- 10us short circuit capability
- Positive  $V_{CE(on)}$  temperature coefficient
- Industry standard package

## ■ APPLICATIONS

- High power inverter
- Switched mode power supplies (SMPS)
- UPS
- Electrical welding machine

## ■ ABSOLUTE MAXIMUM RATINGS

$T_c=25^\circ\text{C}$ , unless otherwise specified

Symbol	Parameter	Conditions	Ratings	Unit
$V_{CES}$	Collector-emitter voltage	-	600	V
$I_C$	DC-collector current	$T_C = 25^\circ\text{C}$	230	A
		$T_C = 50^\circ\text{C}$	200	A
$I_{CRM}$	Repetitive peak collector current	1ms	400	A
$V_{GES}$	Gate-emitter peak voltage	-	$\pm 20$	V
$I_F$	Diode continuous forward current	-	200	A
$I_{FRM}$	Diode repetitive peak forward current	-	400	A
$T_{vj,max}$	Maximum junction temperature	-	-40 ~ 150	$^\circ\text{C}$
$T_{vj,op}$	Operating temperature range	-	-40 ~ 125	$^\circ\text{C}$
$T_{stg}$	Storage temperature range	-	-40 ~ 125	$^\circ\text{C}$
$V_{ISOL}$	Insulation test voltage	50/60Hz, $t=1\text{min}$ $I_{ISOL}=1\text{mA}$	2.5	kV
$M_S$	Mounting screw torque	M6	3.0 ~ 6.0	N.m
$M_t$	Mounting terminals screw torque	M5	2.5 ~ 5.0	N.m

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**PRELIMINARY**

T<sub>J</sub>=25°C unless otherwise specified

## ELECTRICAL CHARACTERISTICS OF IGBT

Symbol	Parameter	Min	Typ	Max	Unit	Conditions
V <sub>CE(Sat)</sub>	C-E saturation voltage	-	2.0	-	V	I <sub>C</sub> = 200A, V <sub>GE</sub> = 15V, T <sub>vj</sub> = 25°C
		-	2.2	-	V	I <sub>C</sub> = 200A, V <sub>GE</sub> = 15V, T <sub>vj</sub> = 125°C
V <sub>GE(th)</sub>	G-E threshold voltage	4.5	5.5	6.5	V	I <sub>C</sub> = 1mA, V <sub>CE</sub> = V <sub>GE</sub>
I <sub>CES</sub>	Zero gate voltage collector current	-	-	500	μA	V <sub>GE</sub> = 0V, V <sub>CE</sub> = 600V
I <sub>GES</sub>	G-E leakage current	-	-	0.4	μA	V <sub>GE</sub> = ±20V
R <sub>Gint</sub>	Internal gate resistance	-	5	-	Ω	-
C <sub>ies</sub>	Input capacitance	-	9	-	nF	V <sub>GE</sub> = 0V, f = 1MHz, V <sub>CE</sub> = 25V, T <sub>vj</sub> = 25°C
C <sub>oes</sub>	Output capacitance	-	1.02	-		
C <sub>res</sub>	Reverse transfer capacitance	-	0.8	-		
Q <sub>g</sub>	Total gate charge	-	tbd	-	μC	V <sub>GE</sub> = ±15V
t <sub>d(on)</sub>	Turn-on delay time	-	180	-	ns	V <sub>CE</sub> = 300V, I <sub>C</sub> = 200A, V <sub>GE</sub> = ±15V, R <sub>G</sub> = 1Ω, T <sub>vj</sub> = 125°C
t <sub>r</sub>	Turn-on rise time	-	49	-		
t <sub>d(off)</sub>	Turn-off delay time	-	285	-		
t <sub>f</sub>	Turn-off fall time	-	41	-		
E <sub>ON</sub>	Turn-on Energy loss	-	4.6	-	mJ	
E <sub>OFF</sub>	Turn-off Energy loss	-	6.3	-		

## ELECTRICAL CHARACTERISTICS OF FRD

T<sub>J</sub>=25°C unless otherwise specified

Symbol	Parameter	Min	Typ	Max	Unit	Conditions
V <sub>F</sub>	Diode Forward Voltage Drop	-	1.4	-	V	T <sub>vj</sub> = 25°C
		-	1.35	-		T <sub>vj</sub> = 125°C
I <sub>rr</sub>	Peak Reverse Recovery Current	-	200	-	A	I <sub>F</sub> = 200A, V <sub>CE</sub> = 300V
Q <sub>rr</sub>	Diode Recovery Charge	-	32	-	μC	V <sub>GE</sub> = -15V T <sub>vj</sub> = 125°C

## THERMAL AND MECHANICAL CHARACTERISTICS

T<sub>J</sub>=25°C unless otherwise specified

Symbol	Parameter	Min	Typ	Max	Unit	Condition
R <sub>th(j-c)</sub>	Junction-to-Case (IGBT Part, Per 1/2 Module)	-	0.17	-	K/W	
R <sub>th(j-c)</sub>	Junction-to-Case (FRD Part, Per 1/2 Module)	-	0.4	-	K/W	
R <sub>th(c-f)</sub>	Case-to-Heat Sink (With Thermal Compound)	-	0.05	-	K/W	
Weight	Module		180		g	

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PRELIMINARY

### PERFORMANCE CURVES (I)

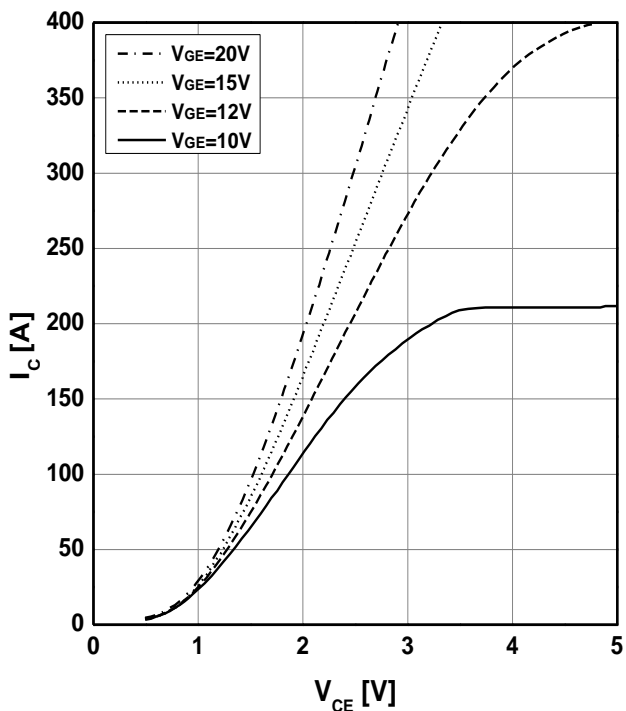


Fig1. Typical Output Characteristics

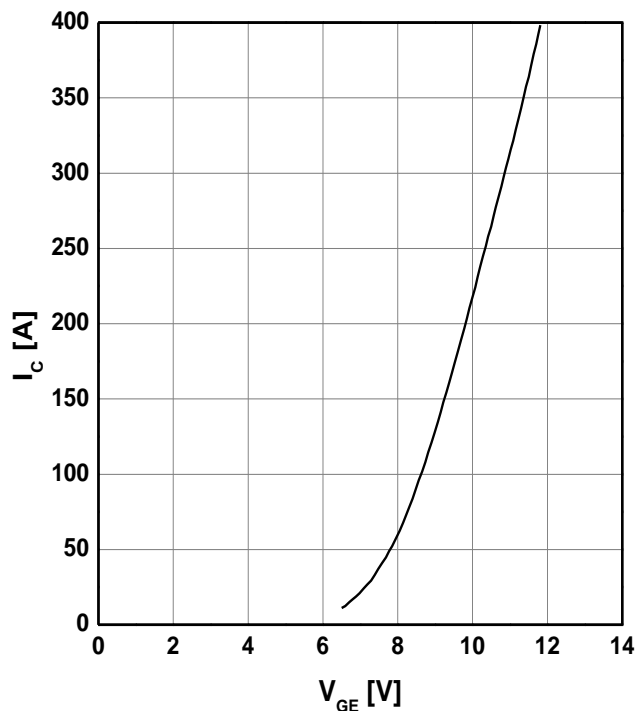


Fig2. Transfer Characteristics

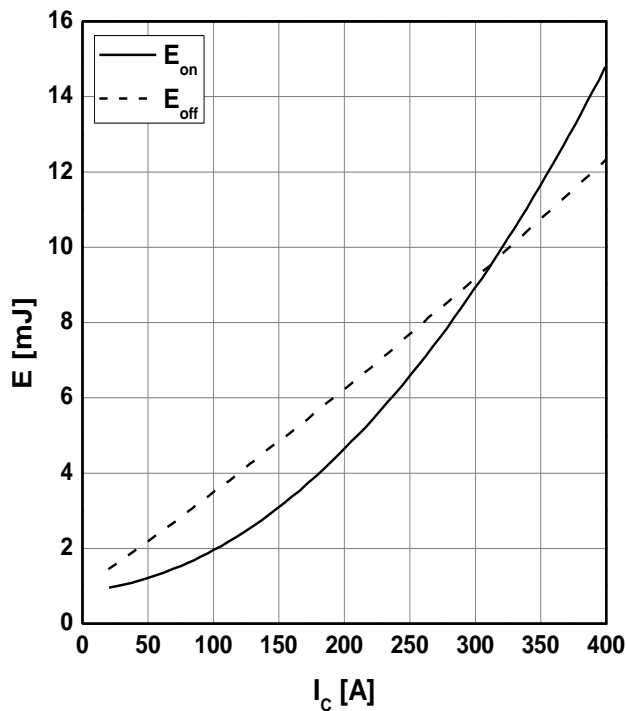


Fig3. Energy Loss vs. I<sub>c</sub>

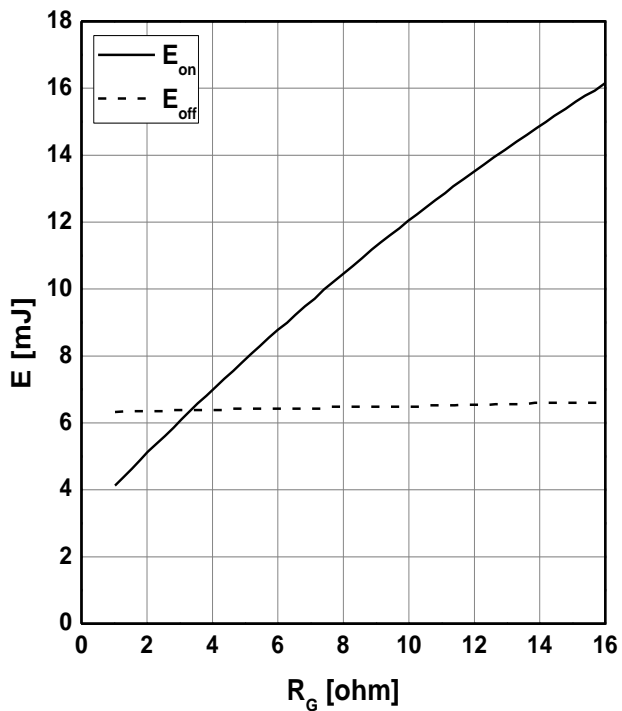


Fig4. Energy Loss vs. R<sub>G</sub>

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PRELIMINARY

■ PERFORMANCE CURVES (II)

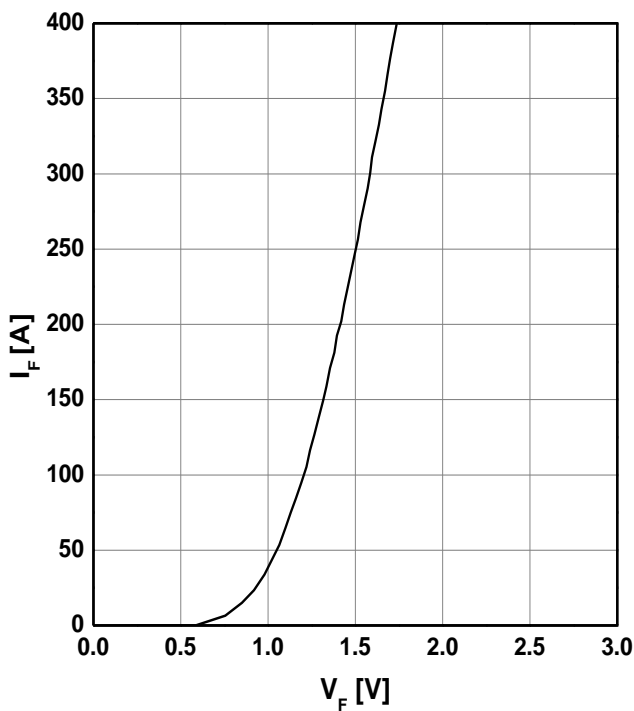


Fig5. DIODE Forward Characteristic

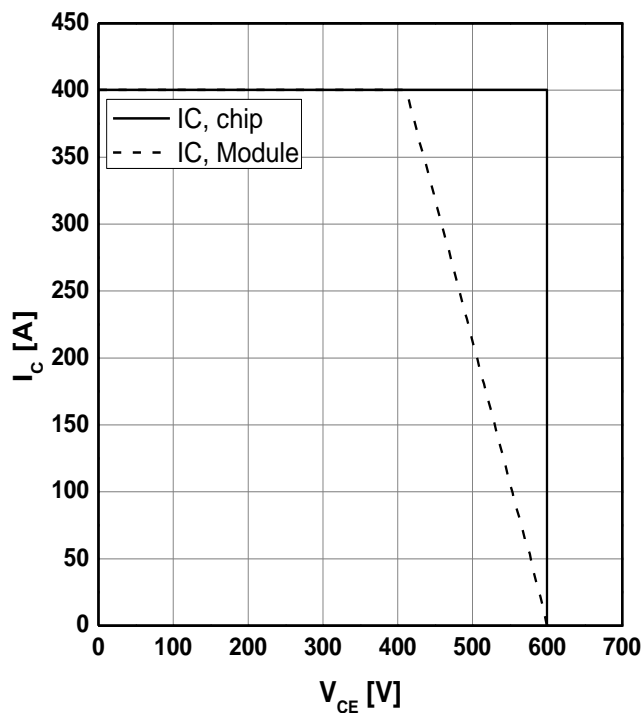


Fig6. Reverse Bias SOA ( $T_{vj} = 125^{\circ}\text{C}$ )

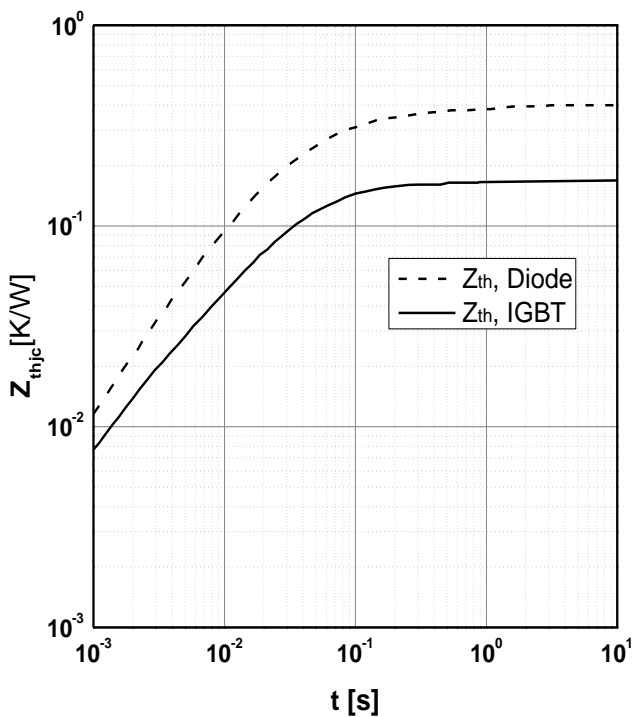


Fig7. Transient Thermal

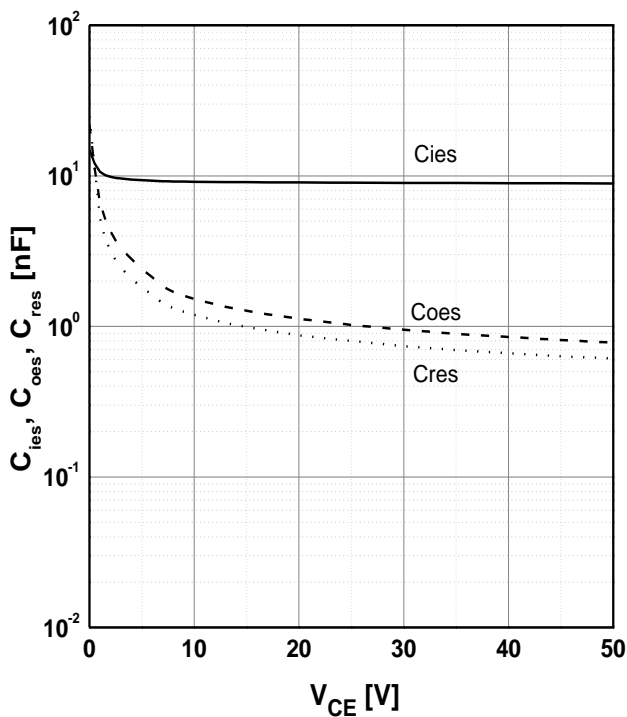


Fig8. Typ. Capacitance

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PRELIMINARY

## PACKAGE OUTLINES

